



CHEMICAL UPDATE WORKSHEET

Chemical Name: **Acenaphthylene**

CAS#: **208-96-8**

Revision Date: November 16, 2015

Revised by: RRD Toxicology Unit

SECTION A: CHEMICAL-PHYSICAL PROPERTIES

Property	Part 201 Value	Updated Value	Reference Source	Comments
Molecular Weight (g/mol)	152.271	152.20	EPI	EXP
Physical State at ambient temp	Solid	Solid	MDEQ	
Melting Point (°C)	---	92.50	EPI	EXP
Boiling Point (°C)	280	280.00	EPI	EXP
Solubility (µg/L)	3930	1.61E+04	EPI	EXP
Vapor Pressure (mmHg at 25°C)	0.01	6.68E-03	EPI	EXP
HLC (atm-m ³ /mol at 25°C)	1.48E-3	1.14E-04	EPI	EXP
Log Kow (log P; octanol-water)	3.6	3.94	EPI	EXP
Koc (organic carbon; L/kg)	3460	5027	EPI	EST
Ionizing Koc (L/kg)		NR	NA	NA
Diffusivity in Air (Di; cm ² /s)	0.08	4.50E-02	W9	EST
Diffusivity in Water (Dw; cm ² /s)	8.0E-6	6.9822E-06	W9	EST
Soil Water Partition Coefficient (Kd; inorganics)	NR	NR	NA	NA
Flash Point (°C)	NA	NA	NA	NA
Lower Explosivity Level (LEL; unit less)	NA	NA	NA	NA
Critical Temperature (K)		NA	NA	NA
Enthalpy of Vaporization (cal/mol)		NA	NA	NA
Density (g/mL, g/cm ³)		0.8987	CRC	EXP
EMSOFT Flux Residential 2 m (mg/day/cm ²)	1.40E-05	5.11E-06	EMSOFT	EST
EMSOFT Flux Residential 5 m (mg/day/cm ²)	1.53E-05	5.11E-06	EMSOFT	EST
EMSOFT Flux Nonresidential 2 m (mg/day/cm ²)	1.75E-05	6.46E-06	EMSOFT	EST
EMSOFT Flux Nonresidential 5 m (mg/day/cm ²)	1.83E-05	6.46E-06	EMSOFT	EST

SECTION B: TOXICITY VALUE/BENCHMARKS

Values for:	Part 201 Value	Updated Value	Source/Reference and Date	Comments, Notes, Issues
Reference Dose (RfD) (mg/kg/day)	7.1 E-3	6.0E-2	TCEQ, 2001	
RfD Details	MDNR/ERD review in 1993 found that toxicity data were inadequate for RfD derivation. However, a policy decision was reached which justified application of an additional 10-fold UF to the naphthalene RfD for derivation of an interim cleanup criterion. CCD/RRD date: 4/23/1993	<p>Tier 3 Source: TCEQ and NYDEC: Basis: New York DEC (2004) and Texas CEQ (2001) used the IRIS (1994) RfD of 6.0E-2 mg/kg-day for acenaphthene as surrogate chemical. Acenaphthene is structurally and chemically similar to Acenaphthylene. The MDEQ value is lower since MDEQ modified the composite uncertainty factor (UF) of acenaphthene from 3,000 to 10,000. Current EPA practice caps the UF to 3,000; a higher UF increases the level of uncertainty in the dose estimate. See details below.</p> <p>Tier 1 and 2 Sources: IRIS: Per IRIS (1/1/1991), no value at this time. PPRTV: Per PPRTV (7/30/08), no value at this time. MRL: No MRL record available at this time.</p> <p>Tier 3 Sources: MDEQ: Per MDEQ-CCD/RRD (4/23/1993), RfD = 7.1 E-3 mg/kg-day. See Part 201 Value RfD details. Per MDEQ-CCD (3/16/1998) WRD derived an RfD = 1.75E-2 mg/kg-day: Critical Study: 90-day study using acenaphthene, a compound with a similar structure as Acenaphthylene [U.S. EPA. (1989) Subchronic toxicity study in mice with acenaphthene (unpublished draft final report). Prepared by Hazleton Laboratories America, Inc., Rockville, MD (HLA Study No. 2399-127). 627088. (USEPA, 1989) Method: CD-1 mouse (20/sex/group) subchronic (90 days) oral gavage study. Doses: 0, 175, 350, or 700 mg/kg/day acenaphthene Critical effect: liver weight changes with hepatocellular hypertrophy and increased cholesterol levels End point or Point of Departure (POD): NOAEL = 175 mg/kg/day Uncertainty Factors: UF = 10,000 (10 each for intraspecies variability and interspecies and subchronic to chronic extrapolation with an additional 10 for database gap). Source and date: MDEQ-CCD/Water Resources Division, 3/16/1998</p>	Complete	

SECTION B: TOXICITY VALUE/BENCHMARKS

Values for:	Part 201 Value	Updated Value	Source/Reference and Date	Comments, Notes, Issues
		<p>New York DEC: RfD = 0.06 (6.0E-2) mg/kg/day. Per NYSDEC (9/2004) An oral reference dose for Acenaphthylene is not available. An oral reference dose is available for acenaphthene, which is structurally and chemically similar to Acenaphthylene. The similarity between the two chemicals provides a basis for using toxicity data for acenaphthene to represent Acenaphthylene. Therefore, the US EPA reference dose for acenaphthene (0.06 mg/kg/day) is the toxicity value recommended for Acenaphthylene. Source: NYSDEC, 9/2004</p> <p>Texas CEQ: RfD= 6.0E-02 mg/kg/day. Per TCEQ (4/3/2001), no prepublished toxicity values are available for acenaphthalene in IRIS, HEAST, NCEA, or ATSDR. Acenaphthalene is structurally similar to acenaphthene. Acenaphthene will be used as a surrogate for acenaphthalene. Acenaphthene RfD = 6.0E-02 mg/kg-day; Acenaphthalene RfD = 6.0E-02 mg/kg-day.</p> <p>Other Tier 3: No value is available at this time from these Tier 3 sources/databases: HEAST, NTP ROC, health and environmental agencies of California, Massachusetts, Minnesota and New Jersey, WHO (IARC), WHO (IPCS/INCHEM), Canada, The Netherlands (RIVM) and OECD HPV.</p>		
Oral Cancer Slope Factor (CSF) (mg/kg-day) ⁻¹	NA	NA	PPRTV, 2008	
CSF value details		<p>Basis: PPRTV (7/30/2008) is the basis since it is more recent than the RIVM document and relies on the 2005 Cancer Risk Assessment Guidelines.</p> <p>Carcinogen Weight-of-Evidence (WOE) Class: "Inadequate Information to Assess Carcinogenic Potential" per PPRTV 7/30/2008.</p> <p>IRIS WOE Basis: The carcinogenicity of Acenaphthylene has not been assessed by IARC (2008) or NTP (2005, 2008).</p> <p>Source and Date: PPRTV, 7/30/2008</p> <p>Tier 1 and 2 Sources: IRIS: Per IRIS (1/1/1991), no value at this time. MRL: NA; MRLs are for non-cancer effects only. PPRTV, 7/30/2008: Because of the lack of carcinogenic data in humans or animals, under the 2005 <i>Guidelines for Carcinogen Risk Assessment</i> (U.S. EPA, 2005), this PPRTV document</p>		Complete

SECTION B: TOXICITY VALUE/BENCHMARKS

Values for:	Part 201 Value	Updated Value	Source/Reference and Date	Comments, Notes, Issues
		<p>classifies Acenaphthylene as having <i>"Inadequate Information to Assess Carcinogenic Potential."</i></p> <p>Tier 3 Sources: MDEQ: Per DEQ-CCD, no value at this time. RIVM, 2001: The National Institute for Public Health and the Environment of the Netherlands (RIVM) (Baars et al., 2001) concluded that Acenaphthylene is a suspected carcinogen and assigned an oral slope factor of 0.05 (mg/kg-day)⁻¹ that is based on a relative potency value for Acenaphthylene of 0.01 (Kalberlah et al., 1995, as cited in WHO, 1998) compared to the oral slope factor of 0.0005 mg/kg-day for benzo[a]pyrene (Kroese et al., 1999). PPRTV cited this information however, they concluded that this chemical as having inadequate information to assess for carcinogenic potential.</p>		
Reference Concentration (RfC) or Initial Threshold Screening Level (ITSL) (µg/m³)	3.5E+1	2.1E+2	NYDEC, 2005	
RfC/ITSL details	<p>ITSL based on 90 day mouse gavage LOEL from Hazelton (1989). Increased mortality, liver and kidney changes observed at 100 mg/kg at lowest dose level. UF of 10,000 was applied with conversion to inhalation value. CCD/AQD date: 7/23/93</p>	<p>Tier 3 Source: NYDEC: Basis: New York DEC (2004) route to route extrapolation of the IRIS (1994) RfD of 6.0E-2 mg/kg-day for acenaphthene as surrogate chemical. Acenaphthene is structurally and chemically similar to Acenaphthylene. The MDEQ ITSL for acenaphthene is 3.5E+1 µg/m³ based on the same oral RfD however, MDEQ modified the composite uncertainty factor (UF) of acenaphthene from 3,000 to 10,000. Current EPA practice caps the UF to 3,000 as a UF of 10,000 increases the level of uncertainty in the dose estimate. As a result, the DEQ value was not used. See details below. Tier 1 and 2 Sources: IRIS: Per IRIS (1/1/1991), no value at this time. PPRTV: Per PPRTV (7/30/08), no value at this time. MRL: No MRL record available at this time.</p> <p>Tier 3 Sources: MDEQ: Per MDEQ-AQD (7/23/1993), ITSL = 3.5E+1 µg/m³ with 24 hour averaging time. Critical Study: 90 day study using acenaphthene, a compound with a similar structure as Acenaphthylene (U.S. EPA. (1989) Subchronic toxicity study in mice with acenaphthene</p>		Complete

SECTION B: TOXICITY VALUE/BENCHMARKS

Values for:	Part 201 Value	Updated Value	Source/Reference and Date	Comments, Notes, Issues
		<p>(unpublished draft final report). Prepared by Hazleton Laboratories America, Inc., Rockville, MD (HLA Study No. 2399-127). 627088. (USEPA, 1989)</p> <p>Method: CD-1 mouse subchronic (90 days) oral gavage study</p> <p>Critical effect: Increased mortality, liver and kidney changes</p> <p>End point or Point of Departure (POD): LOEL = 100 mg/kg</p> <p>Uncertainty Factors: UF = 10,000</p> <p>Source and date: MDEQ-AQD; 7/23/1993</p> <p>New York DEC: RfC = 210 (2.1E-2) $\mu\text{g}/\text{m}^3$. Per NYSDEC (2/2005), Acenaphthylene is a systemic toxicant that is expected to be absorbed into the body following both oral and inhalation exposure and for which an oral reference dose for a chemically similar surrogate (acenaphthene) based on effects distant from the site of contact (i.e., the gastrointestinal lining) exists. A RfC is calculated from the surrogate RfD (0.06 mg/kg-day) for chemicals that are systemic toxicants, assuming a 70 kilogram individual inhales 20 cubic meters of air per day. Therefore, based on the chemical surrogate and exposure route extrapolation, a RfC of 210 mcg/m^3 is derived.</p> <p>Other Tier 3: No value is available at this time from these Tier 3 sources/databases: HEAST, NTP ROC, health and environmental agencies of California, Massachusetts, Minnesota and New Jersey, WHO (IARC), WHO (IPCS/INCHEM), Canada, The Netherlands (RIVM) and OECD HPV.</p>		
Inhalation Unit Risk Factor (IURF) ($(\mu\text{g}/\text{m}^3)^{-1}$)	--	NA	MDEQ,2015	
IURF details	NA	<p>Carcinogen Weight-of-Evidence (WOE) Class: "Inadequate Information to Assess Carcinogenic Potential."</p> <p>IRIS WOE Basis: The carcinogenicity of Acenaphthylene has not been assessed by IARC (2008) or NTP (2005, 2008).</p> <p>Source and Date: PPRTV, 7/30/2008</p> <p>Tier 1 and 2 Sources:</p> <p>IRIS: Per IRIS (1/1/1991), no value at this time.</p> <p>PPRTV: Per PPRTV (7/30/2008), no value at this time</p> <p>MRL: NA; MRLs are for non-cancer effects only.</p>		Complete

SECTION B: TOXICITY VALUE/BENCHMARKS

Values for:	Part 201 Value	Updated Value	Source/Reference and Date	Comments, Notes, Issues
		Tier 3 Source: MDEQ: Per DEQ-CCD, no value at this time.		
Mutagenic Mode of Action (MMOA)? (Y/N)	--	NO	USEPA, 2015	
MMOA Details	--	NA Not listed as a carcinogen with mutagenic MOA in the USEPA OSWER List.		
Developmental or Reproductive Effector? (Y/N)	No	No, the RfD or RfC/ITSL is not based on a reproductive-developmental effect.	MDEQ, 2015	
Developmental or Reproductive Toxicity Details	NA	NA		
State Drinking Water Standard (SDWS) (µg/L)	NA	NO	SDWA, 1976	
SDWS details	NA	MI Safe Drinking Water Act (SDWA) 1976 PA 399		
Secondary Maximum Contaminant Level (SMCL) (ug/L)	--	NO	SDWA, 1976 and USEPA SMCL List	
SMCL details	NA	MI Safe Drinking Water Act (SDWA) 1976 PA 399 and USEPA SMCL List		
Is there an aesthetic value for drinking water? (Y/N)	NO	Not evaluated.	NA	
Aesthetic value (ug/L)	NA	NA	NA	
Aesthetic Value details	NA	NA		

SECTION B: TOXICITY VALUE/BENCHMARKS

Values for:	Part 201 Value	Updated Value	Source/Reference and Date	Comments, Notes, Issues
Phytotoxicity Value? (Y/N)	NO	Not evaluated.	NA	
Phytotoxicity details	NA	NA		
Others				

SECTION C: CHEMICAL-SPECIFIC ABSORPTION FACTORS

Absorption Factors For:	Part 201 Value	Updated Value	Source/Reference and Date	Comments, Notes, Issues
Gastrointestinal absorption efficiency value (ABS _{gi})	---	1.0	MDEQ, 2015/USEPA RAGS-E	
ABS _{gi} details		RAGS E (EPA, 2004) Default Value		
Skin absorption efficiency value (AE _d)	---	0.1	MDEQ, 2015	
AE _d details				
Ingestion Absorption Efficiency (AE _i)		1.0	MDEQ, 2015	
AE _i Details				
Relative Source Contribution for Water (RSC _w)		0.2	MDEQ, 2015	
Relative Source Contribution for Soil (RSC _s)		1.0	MDEQ, 2015	
Relative Source Contribution for Air (RSC _a)		1.0	MDEQ, 2015	
Others				

SECTION D: RULE 57 WATER QUALITY VALUES AND GSI CRITERIA

Current GSI value (µg/L): ID

Updated GSI value (µg/L): ID

Rule 57 Drinking Water Value (µg/L): ID

	Rule 57 Value (µg/L)	Verification Date
Human Non-cancer Values- Drinking water source (HNV-drink)	ID	3/1998
Human Non-Cancer Values- Non-drinking water sources (HNV-Non-drink)	ID	3/1998
Wildlife Value (WV)	NA	
Human Cancer Values for Drinking Water Source (HCV-drink)	NA	
Human Cancer values for non-drinking water source (HCV-Non-drink)	NA	
Final Chronic Value (FCV)	ID	7/2004
Aquatic maximum value (AMV)	ID	7/2004
Final Acute Value (FAV)	ID	7/2004

Sources: 1. Surface Water Assessment Section Rule 57 [website](#)2. Rule 57 [table](#)

SECTION E: TARGET DETECTION LIMITS (TDL)

	Rule 57 Value (µg/L)	Verification Date
Target Detection Limit – Soil (µg/kg)	330	MDEQ, 2015
Target Detection Limit – Water (µg/L)	5	MDEQ, 2015
Target Detection Limit – Air (ppbv)	5.60E+00	MDEQ, 2015
Target Detection Limit – Soil Gas (ppbv)	1.90E+02	MDEQ, 2015

ABBREVIATIONS USED IN THIS WORKSHEET:

CAS# = Chemical Abstract Service Number

NA = Not Available or Not Applicable

NR = Not Relevant

ABBREVIATIONS USED IN SECTION A – CHEMICAL-PHYSICAL PROPERTIES

Reference Sources:

ABBREVIATION	MEANING
CRC	Chemical Rubber Company Handbook of Chemistry and Physics, 95th edition, 2014-2015
EMSOFT	U.S. EPA exposure model for soil-organic fate and transport (emsoft) (epa, 2002)
EPA2001	U.S. EPA (2001) Fact Sheet, Correcting the Henry's Law Constant for Soil Temperature. Office of Solid Waste and Emergency Response, Washington, D.C.
EPA4	USEPA (2004) User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings. February 22, 2004.
EPI	USEPA's Estimation Programs Interface SUITE 4.1, Copyright 2000-2012
HSDB	Hazardous Substances Data Bank
MDEQ	Michigan Department of Environmental Quality
NPG	National Institute for Occupational Safety and Health Pocket Guide to Chemical Hazards
PC	National Center for Biotechnology Information's PubChem database
PP	Syracuse Research Corporation's PhysProp database
SCDM	USEPA's Superfund Chemical Data Matrix
SSG	USEPA's Soil Screening Guidance: Technical Background Document, Second Edition, 1996
USEPA/EPA	United State Environmental Protection Agency's Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). July 2004
W9	USEPA'S User Guide for Water9 Software, Version 2.0.0, 2001

Basis/Comments:

ABBREVIATION	MEANING
EST	Estimated
EXP	Experimental
EXT	Extrapolated

ABREVIATIONS USED IN SECTION B – TOXICITY VALUES/BENCHMARKS

Reference Sources:

ABBREVIATION	MEANING
CRC	Chemical Rubber Company Handbook of Chemistry and Physics, 95th edition, 2014-2015
ATSDR	Agency for Toxic Substances and Disease Registry
CALEPA	California Environmental Protection Agency
CAL DTSC	California Department of Toxic Substances Control
CAL OEHHA	CALEPA Office of Environmental Health Hazard Assessment
CCD	MDEQ Chemical Criteria Database
ECHA	European Chemicals Agency (REACH)
OECD HPV	Organization for Economic Cooperation and Development HPV Database
HEAST	USEPA's Health Effects Assessment Summary Tables
IRIS	USEPA's Integrated Risk Information System
MADEP	Massachusetts Department of Environmental Protection
MDEQ/DEQ	Michigan Department of Environmental Quality
DEQ-CCD/AQD	MDEQ Air Quality Division
DEQ-CCD/WRD	MDEQ Water Resources Division
MNDOH	Minnesota Department of Health
NJDEP	New Jersey Department of Environmental Protection
NYDEC	New York State Department of Environmental Protection
OPP/OPPT	USEPA's Office of Pesticide Programs
PPRTV	USEPA's Provisional Peer Reviewed Toxicity Values
RIVM	The Netherlands National Institute of Public Health and the Environment
TCEQ	Texas Commission on Environmental Quality
USEPA	United States Environmental Protection Agency
USEPA OSWER	USEPA Office of Solid Waste and Emergency Response
USEPA MCL	USEPA Maximum Contaminant Level
WHO	World Health Organization
WHO IPCS	International Programme on Chemical Safety (IPCS/INCHEM)
WHO IARC	International Agency for Research on Cancers

Toxicity Terms:

ABBREVIATION	MEANING
BMC	Benchmark concentration
BMCL	Lower bound confidence limit on the BMC
BMD	Benchmark dose
BMDL	Lower bound confidence limit on the BMD
CSF	Cancer Slope Factor
CNS	Central nervous system
IURF/IUR	Inhalation unit risk factor
LOAEL	Lowest observed adverse effect level
LOEL	Lowest observed effect level
MRL	Minimal risk level (ATSDR)
NOAEL	No observed adverse effect level
NOEL	No observed effect level
RfC	Reference concentration
RfD	Reference dose
p-RfD	Provisional RfD
aRfd	Acute RfD
UF	Uncertainty Factor
WOE	Weight of evidence

ABREVIATIONS USED IN SECTION C – CHEMICAL-SPECIFIC ABSORPTION FACTORS

ABBREVIATION	MEANING
MDEQ	Michigan Department of Environmental Quality
USEPA RAGS-E	USEPA's Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). July 2004

ABREVIATIONS USED IN SECTION D – RULE 57 WATER QUALITY VALUES AND GSI CRITERIA

ABBREVIATION	MEANING
GSI	Groundwater-surface water interface
ID	Insufficient data to derive value
NLS	No literature search has been conducted